METHOD AND APPARATUS FOR MANUFACTURING COFFEE INFUSION PODS

BACKGROUND OF THE DISCLOSURE

Field of the Invention

[0001] The present invention relates to devices for manufacturing infusion pods, and more particularly for manufacturing coffee pods and tea pods with a portable compact press. The invention is particularly directed to the customized in-home manufacture of coffee pods by an operator using personally chosen coffee grinds and a press suitable for use on a kitchen countertop.

Description of the Related Art

[0002] It is known in the art to contain a quantity of coffee, tea, or other infusable material in a package for use in brewing devices, such as coffeemakers. *Rehman et al.*, US 5,012,629, issued May 7, 1991 for a METHOD FOR PRODUCING INFUSION COFFEE FILTER PACKS, discloses a method for producing infusion coffee filter packets in which a first strip of filter material is placed adjacent to a mold having a cylindrical mold pocket. The strip of filter material is caused, either mechanically or by a vacuum, to conform to the cylindrical mold pocket. The conforming step causes the surface area of the first strip of filter material to stretch and increase by at least three percent relative to its area prior to the conforming step.

[0003] A measured quantity of ground coffee is then deposited into the mold pocket over the filter material conformed thereto. A second strip of filter material is placed over the first strip of filter material and the ground coffee in the mold pocket. The first and second strips of filter material are then sealed together around the coffee filled mold pocket, as by a heat sealing press pressing and sealing the strips together.

[0004] The filter material is then trimmed as by die cutting to produce a half inch wide flange area extending around the mold pocket. The presence of the one half inch flange in combination with the increased surface area caused by stretching results in a brewed coffee having an increase in soluble solids extraction and a decrease in the standard deviation of soluble solids extraction. While such commercially available coffee pods perform well, a user may want to brew a specific type of blend of coffee not commercially available in "pod" form.

BRIEF SUMMARY OF THE DISCLOSURE

[0005] A mechanism for the manufacture of an infusion pod includes a mold defining a depression therein. The depression defines the shape of the bottom of the infusion pod. The opening of the depression is rimmed with a mold sealing surface. A press or form includes a bolt and a bolt carrier, with the bolt defining a protrusion in substantial interengaging conformity to the shape of the depression. The bolt carrier, has a resilient member against which the bolt is mounted such that the form is resiliently mounted to the bolt carrier. A sealing bolt carrier surface has a surface topography in substantial interlocking conformity with the mold sealing surface.

[0006] The bolt carrier is axially moveably mounted relative to the mold such that the mechanism may be electrically driven or manually operated to repeatedly bring the form into contact with the mold in such a manner as to bring the mold sealing surface and the sealing bolt carrier surface into compressive contact while simultaneously bringing the bolt and the depression into interlocking contact. The resilient member has a spring coefficient high enough to conform a sheet of filter material to the shape of the depression and mold sealing surface so as to create a flanged filter cup in a cupping operation, yet low enough to avoid overpacking a quantity of an infusable material deposited within the flanged filter cup in a sealing operation.

[0007] In another aspect of the invention, the resilient member is a spring biased against the bolt.

[0008] In another aspect of the invention, the bolt is slideably mounted within the bolt carrier.

[0009] In another aspect of the invention, the bolt is slideably mounted within a channel defined by the bolt carrier and wherein the carrier sealing surface is rimmed about an opening of the channel.

[0010] In another aspect of the invention, the infusion material is a brewable material.

[0011] In another aspect of the invention, the infusion material is coffee.

[0012] In another aspect of the invention, the filter material is a woven thermoplastic.

[0013] In another aspect of the invention, the filter material is selected from polyethylene or polypropylene.

[0014] In another aspect of the invention, the filter material is filter paper.

[0015] The method of the invention further includes manually executing a cupping operation, wherein the cupping operation includes the steps of positioning a first sheet of filter material between the form and the mold, bringing the form into compressive contact with the mold so as to create a flanged filter cup in the cupping operation, and withdrawing the form from the mold, leaving the flanged filter cup in the mold. The flanged filter cup is then filled with an infusible material. This is followed by executing the sealing operation which includes the steps of positioning a second sheet of filter material between the form and the mold, and by bringing the form into compressive contact with the mold so as to seal the second sheet of filter material to the flanged filter cup around and about the flange, thereby creating the infusion pod.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Figures 1a through 1e are perspective views showing the steps in the use of the apparatus of the invention. Figure 1b is shown in partial cross-section.

[0017] Figure 2 is a perspective exploded view of the apparatus of the invention.

[0018] Figure 3 is a cross-sectional view in central section of a cupping operation.

[0019] Figure 4 is a cross-sectional view in central section of a sealing operation.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] In Figure 1a there is shown a mold 1 defining a pocket or depression 8 therein. Rimming the opening of the depression 8 is an annual mold sealing surface 2.

[0021] A form 3 is also provided, having a press or bolt carrier 5 and a press or bolt 4 resiliently mounted therein, such as by a spring such that the protruding bolt 4 may be forced and biased axially into the bolt carrier 5 and spring back out to its original position when released. The bolt carrier 5 has a bolt carrier sealing surface 6, the surface or topography of which is in mating conformity with that of the mold sealing surface 2. The mold 1 is shaped to conform with the shape of the depression 8.

[0022] Referring to Figures 1a and 1b, in a cupping operation, a first sheet of filter material 7 such as of the type used in paper coffee filters, is positioned between the mold 1 and the form 3. The form is then moved axially such that the bolt 4 fits or presses into the depression 8 and thereby shapes the first sheet 7 to the shape of the depression. This operation, which can be done manually or with an electrically driven press, creates a flanged filter cup 9. The cup flange 9' on the filter cup 9 (see Fig. 1e) is formed by compression between the mold and bolt carrier sealing surfaces 2, 6.

[0023] Referring to Figures 1b and 1c, the form 3 is withdrawn from the mold 1 and a quantity of an infusable material 12 (e.g., a brewable material such as coffee grounds or tea) is placed into the filter cup 9, which remains pressed in the depression 8 of the mold 1 after the mold 3 is withdrawn. This step can be done automatically by a metering device or by hand with a spoon or scoop of coffee chosen by the operator.

[0024] In a sealing operation, a second sheet of filter material 13 is positioned between the mold 1 and the form 3. The form 3 is again moved axially into and against the mold 1 so as to compress and attach or stake the second sheet of filter material 13 to the cup flange 9' of the filter cup 9. Bolt 4 also acts to hold the top or second sheet of filter material 13 in place so as to avoid shifting and aid in registration. The first and second sheets of filter material 7, 13 are staked or otherwise pressed and joined together between the mold and bolt carrier sealing surfaces, 2, 6 thereby sealing the second sheet of filter material 13 to the cup 9 about a sealed two layered laminated pod flange 10'. This operation, which can be carried out automatically or by hand, simultaneously creates a cap 11.

[0025] This sealing of the two sheets 7, 13 is possible because the bolt 4 is resiliently mounted to the bolt carrier 5 and therefore axially retracts into the bolt carrier 5 upon compression. The strength of the spring force acting on the bolt 4 will cause packing of the infusable material 12 and will therefore preferably be selected so as not to overpack or underpack the infusable material 12. If the infusable material 12 is underpacked, a weak brew may result as water trickling through the filter may bypass the infusable material particles. If the infusable material 12 is overpacked, water may be unable to flow through the filter at all, or flow at at too slow a rate.

[0026] The sealing of the second sheet of filter material 13 to the filter cup 9 may also be accomplished by heat sealing or with an adhesive. For heat sealing, the filter material must be a heat-sealable material, such as a woven thermoplastic. Woven polyethylene, polypropylene, and the like are suited to this purpose and are relatively inexpensive. Heat sealing also requires that heaters be utilized to heat the mold and bolt carrier sealing surfaces 2, 6.

[0027] Another method of sealing the cap 11 to the cup 9 is by paper staking or stapling. Here, the filter material is preferably paper and the mold and bolt carrier sealing surfaces 2, 6 are provided with a convoluted or tongue and groove interengaging topography that causes the cap and cup to engage and clamp about the flange 9'.

[0028] Referring to Figures 1d and 1e, once the pod 10 is formed, the form 3 is withdrawn from the mold 1 and the infusion pod 10 removed.

[0029] Referring to Figure 2, there is shown a blow-up view of one embodiment of the invention for making round or domed infusion pods. A cylindrical mold 1 engages a cylindrical bolt carrier 5 defining a cylindrical channel therethrough. A cylindrical bolt 4 slideably fits within the bolt carrier 5. The resilient member 20, in this example is simply a spring. The spring may be held in place by a retaining plate 21 fastened to the top of the bolt carrier with fasteners 19. The bolt 4 may be prevented from falling out of the bolt carrier 5 by an annular retaining flange 22 extending outwardly about the bolt circumference. Flange 22 abuts an interior rim 25 in the bolt carrier 5 when the bolt 4 is at its fullest extension.

[0030] Figure 3 is a cross-sectional view showing the form 3 engaged with the mold 1 during the cupping operation such that the bolt 4 compresses the first sheet of filter material to conform to the shape of the depression 8.

[0031] Figure 4 is a cross-sectional view showing the form 3 engaged with the mold 1 during the sealing operation, and demonstrating how the mold and carrier sealing surfaces 2, 6 are in compressive engagement while the bolt 4 resiliently withdraws into the bolt carrier 5, while simultaneously compressing the infusable material 12 within the infusion pod 10 thus created.

[0032] As stated above, the spring force of the resilient member 20 must be strong enough to conform the first sheet of filter material 7 to the depression 8 during the cupping operation. It must be strong enough to pack the infusable material 12 in the sealing operation, yet weak enough to avoid overpacking the infusable material 12 during the sealing operation. The force needed will depend upon the nature of the infusable material 12. Coarsely ground coffees, for example, may generally require more packing force than finely ground coffees and espressos. Teas may require more or less packing depending on flake size. The appropriate spring force for any particular brewable product may, however, be easily ascertained without undue experimentation.

[0033] It should also be noted that movement of the form 3 to engage the mold 1 is purely relative. In an alternative embodiment, the form 3 may be fixed and the mold is moved upward to engage it in the cupping and sealing operations. Alternatively, both mold 1 and form 3 may each be moved toward one another. Hence, for the purposes of this invention, "movement" of the form 3 is to be construed as relative and thereby encompass all three embodiments.

[0034] In one embodiment, the entire manufacturing process may be carried out manually, such as on a kitchen table while making one or two pods 10 for immediate fresh brewing. A lever-operated hand press may also be provided to provide mechanical advantage to the pressing operation. In this case, the mold 1 and form 3 may be mounted in a hand press. Of couse, a powered press may also be used to drive the form 3 and/or the mold 1 into mutual engagement. Such a press may take the form of a portable compact counter top electrical kitchen appliance adapted for home use. In any case, a user can choose a preferred coffee, tea or other brewable material for encapsulation in a pod 10. In this manner, a user is not limited to using commercially mass produced pods, but may select a preferred blend for personalized brewing.

[0034] While various values, scalar and otherwise, may be disclosed herein, it is to be understood that these are not exact values, but rather to be interpreted as "about" such values, unless explicitly stated otherwise. Further, the use of a modifier such as "about" or "approximately" in this specification with respect to any value is not to imply that the absence of such a modifier with respect to another value indicated the latter to be exact.

[0035] Changes and modifications can be made by those skilled in the art to the embodiments as disclosed herein and such examples, illustrations, and theories are for explanatory purposes and are not intended to limit the scope of the claims. Further, the abstract of this disclosure is provided for the sole purpose of complying with the rules requiring an abstract so as to allow a searcher or other reader to quickly ascertain the subject matter of the disclosures contained herein and is submitted with the express understanding that it will not be used to interpret or to limit the scope or the meaning of the claims.